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1. Scope:

This specification describes the procedure for longitudinal seam welding of the 8cm Combined Element Cold Mass Assembly, and is applicable to the operations performed in Area 14, Station 2.

2. Applicable Documents:

The following documents, of the issue in effect at the time of release for manufacture, form a part of this procedure to the extent specified herein:

RHIC-OPM-8.1.1.23	Operation of CQS Shell Welder
RHIC-MAG-Q-1004	Discrepancy Reporting Procedure
RHIC-MAG-Q-1000	Procedure For Control of Measurement Test Equipment

BNL Drawings:

12050141-xx	Assembly, 8cm CQS, Shell Welding
12120146-xx	Assembly, CQT5&6, Shell Welding
12120135-xx	Assembly, CQ9, Shell Welding
12120140-xx	Assembly, CQT4, Shell Welding
12120152-xx	Assembly, CQ7, Shell Welding
12120129-xx	Assembly, CQ8, Shell Welding

3. Requirements:

The 8cm Combined Element Cold Mass Assembly shall be welded in accordance with this specification and associated drawings.

The welding assembly operations shall be performed at Station 2 of Area 14. Welding parameters (weld head speed, wire feed rate) shall be set in accordance with those specified during welding process development and weld procedure qualification. No deviations from these parameters are allowed.

All welding must be performed by welders qualified in accordance with ASME Section IX.

Operation of the shell welding machine and press shall be in accordance with RHIC-OPM-8.1.1.23.

3.1 Material/Equipment

25-1298.01-5 Main Weld Fixture Assembly

3.2 Safety Precautions

- 3.2.1 Operators shall be trained by their cognizant technical supervisor and qualified in the operation of the automatic welding equipment of Area 14-2.
- 3.2.2 No welding shall take place unless all welding screens are in place around the welding station, and all personnel not directly involved with the welding process are outside the screens. Any personnel inside the screens shall wear protective gear to prevent eye injury, and shall be clothed to prevent burns caused by intense ultra-violet light.
- 3.2.3 All lifting and handling operations requiring overhead crane operations shall be performed by holders of valid Safety Awareness Certificates and trained in the use of the lifting device by the Cognizant Engineer or Technical Supervisor.
- 3.2.4 Operation of the shell welding machine and press shall be in accordance with the requirements of RHIC-OPM-8.1.1.23.

3.3 Procedure

- 3.3.1 Position Cradle #1, containing the cold mass sub-assembly from Station 14-1, on the entry conveyor such that the drive pin on the conveyor chain engages the cradle.
- 3.3.2 Position the upper shell against the upper shell banking surface at the corrector end. Lower the shell until it rests on the yoke, then snap into place over the yoke iron.
- 3.3.2.1 Verify correct shell positioning in accordance with the applicable assembly drawing.
- 3.3.3 Slide the weld back-up strips into the slots at the sides of the magnets, and position them as shown on the assembly drawing.
- 3.3.4 Move the cradle/cold mass sub-assembly into the welding station following the procedure of RHIC-OPM-8.1.1.23, until the cradle is in the welding position.

- 3.3.5 Adjust the shell position relative to the back-up strips in order to equalize the weld gaps. In order to prevent weld splatter from entering the magnet, use aluminum tape to cover the shell holes.
- 3.3.6 Activate the weld press top clamp per RHIC-OPM-8.1.1.23. Re-verify proper shell/back-up strip positioning (for equalized weld gaps).
- 3.3.7 Fuse-tack the back-up strips to the laminations (TIG weld, no filler wire) using .5 inch long tacks spaced 6 inches apart along the lower edge of the back-up strip. Start welding at the center of the magnet assembly, and work toward the ends, alternating, in discrete 2 foot increments. This must be performed by two welders, working together and keeping synchronized on both sides of the magnet assembly.
- 3.3.8 Fuse-tack weld (TIG weld, no filler wire) the upper shell edges to the back-up strips, using .5 inch long tacks spaced 6 inches apart. Start at the center of the assembly and work toward both ends, alternating, in discrete 2 foot increments. This must be performed by two welders, working together and keeping synchronized on both sides of the magnet assembly.
- 3.3.9 Measure and record the length of the quadrupole. Mark the mid-point of the quadrupole on the outer surface of the shell, using a lightly scribed line.
- 3.3.10 Place the lower shell on Cradle #2 (25-1298.11-5), with the shell banked against the pin at the Corrector end of the cradle.
- 3.3.11 Raise the magnet assembly to its high position, and secure the support straps around the cold mass. Lower and withdraw the first cradle in accordance with RHIC-OPM-8.1.1.23. Return the first cradle to Area 14, Station 1.
- 3.3.12 In accordance with RHIC-OPM-8.1.1.23, advance the lower shell into position. Raise the shell and cradle until the magnet assembly is supported and the straps are unloaded. Remove the straps. Lower the cradle and magnet assembly into position on the fixture rails. The shell ends must be aligned within .03 inches.
- 3.3.13 Adjust the lower shell position as necessary to equalize the weld root gaps on both sides of the magnet. Raise the shell support cradle to position the lower shell for welding. Tack-weld in place at 3 or 4 locations along the length, using Type ER385L filler wire.

- 3.3.14 Longitudinal Seam Welding - Starting at a point 3 inches from the Corrector end of the shell, perform simultaneous welds on both sides of the magnet using the automatic MIG welding equipment. Stop welding at a point 3 inches from the opposite end of the shell.

NOTE

In the event of an interruption in the weld, the weld must be restarted by returning the weld heads to a point approximately .5 inches before the end of the weld. Restart the weld, and continue to the end point.

CAUTION

The MIG welding process generates large quantities of ultra-violet radiation. Make certain that welding curtains are in place, and that welding personnel are completely shielded during welding operations.

- 3.3.15 Withdraw the cradle and welded cold mass from the welding press onto the exit conveyor.
- 3.4 Crane lift the cold mass assembly from the cradle, rotate it 90⁰, and move it to Station 14-3 for endplate installation.
4. Quality Assurance Provisions:
- 4.1 The Quality Assurance provisions of this procedure require that all assembly and test operations be performed in accordance with the procedural instructions contained herein.
- 4.2 Measuring and test equipment used for this procedure shall contain a valid calibration label in accordance with RHIC-MAG-Q-1000.
- 4.3 All discrepancies shall be identified and reported in accordance with RHIC-MAG-Q-1004.
5. Preparation for Delivery:

N/A